Claims

What is claimed:

1. An Ethernet transceiver comprising:

a plurality of digital signal streams, at least one digital signal stream being coupled to another of the digital signal streams;

a transform block for transforming a plurality of the digital signal streams from an original domain into a lower complexity domain;

a processor for joint processing of the transformed digital signal streams, each joint processed digital signal stream being influenced by other digital signal streams;

an inverse transform block for inverse transforming the joint processed signal streams back to the original domain.

2. The transceiver of claim 1, wherein the joint processing includes multiplying samples of the digital signal streams by a processing matrix.

3. The transceiver of claim 2, wherein diagonal elements of the processing matrix are selected to reduce inter-symbol interference of the digital signal streams.

4. The transceiver of claim 3, wherein diagonal elements of the processing matrix are adaptively selected.

5. The transceiver of claim 4, wherein diagonal elements of the processing matrix are adaptively selected depending upon signal coupling and inter-symbol interference measurements.

6. The transceiver of claim 2, wherein off-diagonal elements of the processing matrix are selected to reduce cross-talk between the digital signal streams.

7. The transceiver of claim 6, wherein the off-diagonal elements of the processing matrix are adaptively selected.

8. The transceiver of claim 7, wherein off-diagonal elements of the processing matrix are adaptively selected depending upon signal coupling and inter-symbol interference measurements.

9. The transceiver of claim 2, wherein the transceiver is transmitting the digital signal streams, and the off-diagonal elements of the processing matrix are selected to provide process cross-talk between the digital signal streams, which cancel transmission cross-talk of the digital signal streams introduced during transmission of the digital signal streams.

10. The transceiver of claim 2, wherein the transceiver is receiving the digital signal streams, and the off-diagonal elements of the processing matrix are selected to cancel transmission cross-talk of the digital signal streams introduced during transmission of the digital signal streams.

11. The transceiver of claim 2, wherein the transceiver is receiving the digital signal streams, and the diagonal elements of the processing matrix are selected to cancel transmission cross-talk of the digital signal streams introduced during reception of the digital signal streams.

12. The transceiver of claim 1, wherein at least one digital signal stream includes time domain processing.

13. The transceiver of claim 1, wherein the joint processing of the transformed signal streams is performed on signal streams to be transmitted.

14. The transceiver of claim 1, wherein the joint processing of the transformed signal streams is performed on received signal streams.

15. The transceiver of claim 1, including N digital signal streams, and M joint processed signal streams.

16. The transceiver of claim 1, including N digital signal streams, and a single joint processed signal stream.

17. The transceiver of claim 1, wherein the transform block additionally transforms filtering coefficients.

18. The transceiver of claim 1, wherein filtering coefficients of the joint processing are determined to reduce interference between Ethernet digital signal streams.

19. The transceiver of claim 18, wherein the filtering coefficients include a transfer domain representation of a time domain filter.

20. The transceiver of claim 1, wherein the digital signal streams are transmitted over an Ethernet network.

21. The transceiver of claim 1, wherein the joint processing provides reduction of near end cross talk.

22. The transceiver of claim 1, wherein the joint processing provides reduction of alien near end cross talk.

23. The transceiver of claim 1, wherein the joint processing provides reduction of far end cross talk.

24. The transceiver of claim 1, wherein the joint processing provides reduction of echo signal interference.

25. The transceiver of claim 1, wherein the joint processing provides reduction of inter-symbol interference.

26. A transceiver comprising:

a plurality of digital signal streams, at least one digital signal stream being coupled to another of the digital signal streams;

a transform block transforming a plurality of the digital signal streams from an original domain into a new domain that allows for less complex processing;

a processor for joint processing of the transformed digital signal streams in the new domain, each joint processed digital signal stream being influenced by other digital signal streams;

an inverse transform block for inverse transforming the joint processed signal streams back to the original domain.

27. A transmitter comprising:

a plurality of digital signal streams, at least one digital signal stream being coupled to another of the digital signal streams;

a transform block transforming a plurality of the digital signal streams from an original domain into a new domain that allows for less complex processing;

a processor for joint processing of the transformed digital signal streams in the new domain, each joint processed digital signal stream being influenced by other digital signal streams;

an inverse transform block for inverse transforming the joint processed signal streams back to the original domain; and

an analog front end for transmitting the joint processed signal streams.

28. A receiver comprising:

an analog front end for receiving analog signal streams, and generating a plurality of digital signal streams, at least one digital signal stream being coupled to another of the digital signal streams;

a transform block transforming a plurality of the digital signal streams from an original domain into a new domain that allows for less complex processing;

a processor for joint processing of the transformed digital signal streams in the new domain, each joint processed digital signal stream being influenced by other digital signal streams;

an inverse transform block for inverse transforming the joint processed signal streams back to the original domain; and

an analog front end for transmitting the joint processed signal streams.

29. A method of joint processing a plurality of digital signal streams;

transforming a plurality of the digital signal streams from an original domain into a lower complexity processing domain;

joint processing of the transformed digital signal streams, each joint processed digital signal stream being influenced by characteristics of other digital signal streams;

inverse transforming the joint processed signal streams back to the original domain.

30. The method of joint processing of claim 29, wherein the transform block additionally transforms filtering coefficients.

31. The method of joint processing of claim 29, wherein a maximal amount of Ethernet signal interference minimization processing is performed in the lower complexity domain.

32. The method of joint processing of claim 29, wherein filtering coefficients of the joint processing are determined to minimize interference between Ethernet digital signal streams.

33. The method of joint processing of claim 29, wherein the digital signal streams are transmitted over an Ethernet network.

34. The method of joint processing of claim 29, wherein the joint processing provides reduction of near end cross talk.

35. The method of joint processing of claim 29, wherein the joint processing provides reduction of alien near end cross talk.

36. The method of joint processing of claim 29, wherein the joint processing provides reduction of far end cross talk.

37. The method of joint processing of claim 29, wherein the joint processing provides reduction of inter-symbol interference.

38. The method of joint processing of claim 29, wherein the joint processing provides reduction of echo signal interference.

39. A network line card, the network line card comprising a bi-directional transceiver, the bi-directional transceiver comprising:

a plurality of digital signal streams, at least one digital signal stream being coupled to another of the digital signal streams;

a transform block for transforming a plurality of the digital signal streams from an original domain into a lower complexity domain;

a processor for joint processing of the transformed digital signal streams, each joint processed digital signal stream being influenced by other digital signal streams;

an inverse transform block for inverse transforming the joint processed signal streams back to the original domain.

40. A server comprising a bi-directional transceiver, the bi-directional transceiver comprising:

a plurality of digital signal streams, at least one digital signal stream being coupled to another of the digital signal streams;

a transform block for transforming a plurality of the digital signal streams from an original domain into a lower complexity domain;

a processor for joint processing of the transformed digital signal streams, each joint processed digital signal stream being influenced by other digital signal streams;

an inverse transform block for inverse transforming the joint processed signal streams back to the original domain.

41. A LAN system comprising a bi-directional transceiver, the bi-directional transceiver comprising:

a plurality of digital signal streams, at least one digital signal stream being coupled to another of the digital signal streams;

a transform block for transforming a plurality of the digital signal streams from an original domain into a lower complexity domain;

a processor for joint processing of the transformed digital signal streams, each joint processed digital signal stream being influenced by other digital signal streams;

an inverse transform block for inverse transforming the joint processed signal streams back to the original domain.